

Robotic ISRU Construction of Planetary Landing and Launch Pad, Phase I

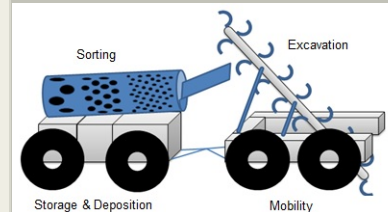
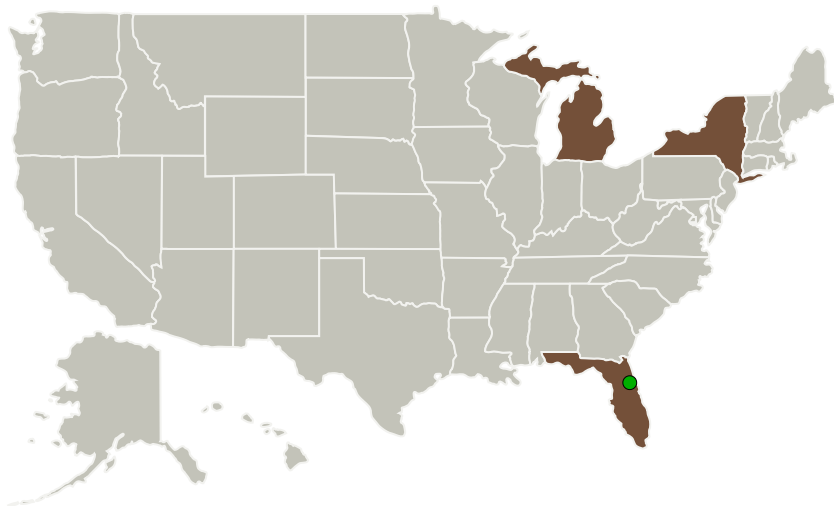
Completed Technology Project (2016 - 2017)



Project Introduction

The Apollo 15 Lunar Module rocket plume excavated regolith which sandblasted at speeds in excess of 1000 m/s the Surveyor 2 lander 200 m away. A Curiosity rover instrument was permanently damaged during SkyCrane landing on Mars. Any future human surface missions to planetary bodies covered in regolith (e.g. Mars, Moon) would need to address ejecta created during landing or takeoff. The intent of this project is to develop a fully robotic system for building landing pads on planetary bodies. The system will excavate in-situ regolith, sort rocks according to needed particle sizes, and layout a carefully designed landing/launch pad apron to lock in the small regolith particles. To that extent, Honeybee/MTU propose to design and build a robotic tool to perform the following 3 actions: Pick up or excavate rocks, sort the rocks in three size ranges, and deposit said rocks in three layers with the purpose to stabilize the fine regolith in the secondary apron zone of Lunar and Martian landing pads for repeated landings and take-offs.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
● Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida
Michigan Technological University(MTU)	Supporting Organization	Academia	Houghton, Michigan

Primary U.S. Work Locations

Florida	Michigan
New York	

Project Transitions

▶ **June 2016:** Project Start

✓ **June 2017:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139567>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Honeybee Robotics, Ltd.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

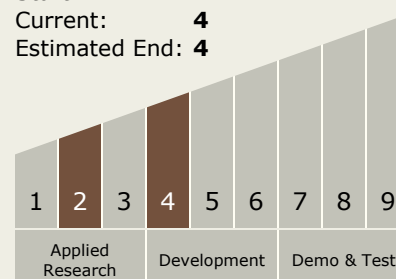
Carlos Torrez

Principal Investigator:

Paul Susante

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4

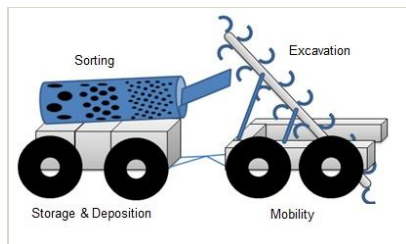


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Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/132506>)

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.1 In-Situ Resource Utilization
 - └ TX07.1.4 Resource Processing for Production of Manufacturing, Construction, and Energy Storage Feedstock Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System